Re-analyses of Historical Climate Data for Key Atmospheric Features: Implications for Attribution of Causes of Observed Change

Public Review Comments on Draft Prospectus for Synthesis and Assessment Product 1.3

Comments received from 14 December 2005 – 30 January 2006

Also available: CCSP Synthesis and Assessment Products. Four-page background document (dated September 2007). In addition, it is available as a PDF file and can be ordered in hardcopy from the GCRIO Online Catalog

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GENERAL COMMENTS

General Comments--Bernstein

- The primary questions to be addressed in Section 1.1 of the report are important and the design of the synthesis and assessment should provide answers to these questions. The questions being asked in Section 1.2 are also important, but I cannot understand how questions two and three of the bullet point list at the bottom of Pg. 3 can be answered if the data analysis period is limited to a half century. It is well established that there are several important cycles in atmospheric circulation. ENSO is the quickest of these with a cycle length of 3-7 years. However, the North Atlantic Oscillation, which affects climate in the Northern Hemisphere, apparently has a cycle length of 60-80 years, longer than the period to be evaluated in this assessment. The Pacific Decadal Oscillation also has a cycle time measured in decades. The period being studies is too short to allow judgments to be made about the impacts of these cycles. If such judgments cannot be

made, how can the nature and cause of rapid climate shifts in atmospheric circulation during the 20th century (e.g. the mid-1970s), or the impact of circulation changes on climate variability be assessed?

- Many of the questions addressed in this synthesis and assessment product involve statistical issues, yet there is not a statistician on the author team. The author team is composed meteorologists, climatologists, and Earth scientists. While all are distinguished researchers and I am sure they have a working knowledge of statistics, it is critical that a respected statistician, preferably one who has not specialized in the analysis of climate or weather data, be added to the author team to provide an outside perspective on the treatment of data in this assessment.

General Comments -- Kheshgi

This draft prospectus addresses 2 topics (sections 1.1 and 1.2). In addressing these topics, the linkages with reanalyses is unclear in the draft prospectus (particularly for the attribution topic), therefore, the charge to authors is unclear. To fully address either of these topic questions would require reaching beyond information contained in reanalysis products.

For example, consideration of the attribution question requires accounting for the effects of less-certain factors in the climate system such as the full spectrum of aerosol effects and long-time-scale variability in ocean transport, both of which are not sufficiently addressed within existing reanalyses.

Suggest that the prospectus be revised to clarify the charge, and that the author team be modified to reflect this charge.

General Comments -- MacCracken

First General Comment: I would suggest that this Prospectus, as written, is not fully consistent with the requirements and process of the Federal Advisory Committee Act (FACA). In particular, the description included in Section 6 on the review process seems seriously at variance with what is required under FACA, under which this synthesis and assessment is supposed to take place. In fact, this write-up reads much more as if this Prospectus was prepared under the original CCSP guidelines, which I understand the legal counsel offices of the agencies have said did not conform with FACA, and then only modified in a minimal manner. In revising this draft Prospectus, it really needs to be made clearer that FACA has a number of requirements for the meetings of the advisory committee being public, the documents (including drafts) being available on a continuing basis through agencies at their Freedom of Information libraries, etc. –these requirements should be spelled out explicitly to make it very clear that FACA will be fully followed (e.g., at all stages, any material sent to the whole committee, or at least most of it, needs, I believe, to be generally available to the public by providing public access to the set of advisory committee materials and records. And I would note that making these materials public available as the law requires also helps to insulate the advisory committee from problems of anonymous leaks of the draft to the press, etc. (if a document is public, they seem to pay much less attention than if it is not).

Second General Comment: Further, I do

not believe that FACA requires an external review process for advisory committee reports, although it can be called for. I personally think a review is a good idea and the agency group could include certain types of provisions regarding the final review process, but I do not think all of the ones indicated in the description here are acceptable—this is a report of the advisory committee and not of the agencies or government as a whole. In revising the text included in the Prospectus, I would urge a careful re-check of the text of FACA on the requirements and, as text is written, imagine imposing the requirements on other major advisory committees that have in the past been led by prominent citizens, former government officials, etc. Also, it is essential to remember that this report is an**advisory committee report** and thus must,*in its final form*, be considered by *all*members of the advisory committee (e.g., through a final vote or formal sign-off process). While it is acceptable for agencies to offer comments for consideration during the review process and for the agencies to not accept the report until after the advisory committee has prepared a report that considers the scope called for in the report and after a suitable review has been conducted, in the end, this is a report of this committee, and the agencies are free to take it or leave it (recall the settlement of the first lawsuit against the US National Assessment, which made clear that advisory committee reports are not federal policy). The CCSP (in particular NOAA) is creating a federal advisory committee, seeking their input—it cannot dictate the content of the report and the write-up here would allow for this. Agencies, together or separately, do not get to dictate what the report says—if the these are to be agency reports (that is, the agencies have the last word on what they say), then they must be written by

government employees without calling together an author team including external members. For the credibility of the report, and of the participating scientists, the FACA rules must be rigorously applied.

General Comments -- Trenberth

First General:

My major comment on this activity is that it should not take place at all but instead resources (human and funds) should be used elsewhere on actually doing reanalysis and research relevant to it, as previously recommended. Reanalysis is an extremely important activity that should be progressing and the next generation reanalysis should be started in place of this assessment.

There are numerous reports from workshops, assessments and recommendations both internationally and in the U.S. that spell out what the problems are with current reanalyses and what the needs are. The prospectus is especially deficient in not recognizing the Fourth IPCC Assessment AR4, already well underway, with the First Order Draft already reviewed and the Second Order Draft available soon in 2006. Many comments exist in AR4 on reanalyses and their inadequacies. AR4 also deals with attribution and all the questions posed in section 1.2 of this prospectus, and this report has no business in duplicating those efforts. Moreover there is only one person on the LA list (Karoly) who is involved in AR4 and has knowledge of these aspects. However, IPCC does not make recommendations. That role falls to WCRP, who have addressed these issues through the WCRP Observation and Assimilation Panel (which I chair). Reports on Data Assimilation, and Reanalysis highly relevant

to this activity are available online, see the WOAP home page and the links to the two reports: here and here.

Recent workshops on reanalyses that have taken place include recommendations, still not implemented, from the ECMWF workshop in late 2001 (ECMWF 2002) and especially the U.S. workshop in August 2003 (Arkin et al. 2004). GCOS has written extensively about the need for further and ongoing reanalyses in their "adequacy report" (Mason et al 2003) and implementation plan (Mason et al. 2004) and this has also been taken up by GEOSS. Scientific aspects are addressed in Trenberth et al (2002, 2005) and also in the first CCSP assessment on vertical temperature structure, and all of this was brought together in a CCSP working Group report from 2005 (led by Schubert and White).

Arkin, P., E. Kalnay, J. Laver, S. Schubert and K. Trenberth, 2004: *Ongoing analysis of the climate system: A workshop report*. Proc workshop Boulder CO 18-20 August, 2003. 48 pp.

ECMWF 2002: Workshop on Reanalysis. ECMWF, Reading, 5-9 November 2001. ERA-40 Proj. Rep. Ser. 3

Mason, P., K. E. Trenberth et al., 2003: *The Second Report on the Adequacy of the Global Observing System for Climate in Support of the UNFCCC*. GCOS-82, WMO/TD 1143. 84pp.

Mason, P., K. E. Trenberth et al., 2004*: Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*. GCOS-92, WMO/TD 1219. 136pp.

Trenberth, K. E., T. R. Karl and T. W. Spence, 2002: The need for a systems approach to

climate observations. *Bull. Amer. Meteor. Soc*., **83**, 1558-1559 (abstract) 1593–1602.

Trenberth, K. E., B. Moore, T. R. Karl, and C. Nobre, 2005: Monitoring and prediction of the Earth's climate: A future perspective. *J. Climate*, (CLIVAR special issue), in press.

I would also like to quote an excerpt from a letter from the Chair of the JSC WCRP to the Chair CEOS 22 June 2005:

"A key part of this activity should also be full exploitation of past data through their reprocessing and use in global reanalyses of atmosphere (such as the recently completed ERA-40), ocean and land, as progress is made on algorithm development and solutions are found to problems such as discontinuities in the record across different instruments and satellites, drift-in-orbit effects, and all issues related to the creation of true CDRs. Adequate support for reprocessing is also essential, and complements the efforts undertaken by modelling centres on global atmosphere and ocean reanalyses." CDR refers to a Climate Data Record.

Given all of these reports, and recommendations, there is already a clear call for ongoing reanalysis and major efforts to address inhomogeneities in the observing system that become reflected in the reanalyses. The required research program and operational ongoing activities (including observing system experiments) have been endorsed by the workshops, and funds would be much better spent on getting on with what is needed instead of carrying out another assessment that is likely to at best duplicate other efforts and is likely to be incomplete as it does not adequately represent the climate

change (IPCC) community.

Reviewer's name, affiliation: Kevin Trenberth, NCAR

SPECIFIC COMMENTS

Specific Comments -- Kheshgi

Page 3, line 24: The lead sentence of this section seems to limit this report to the "present uses and limitations of reanalysis products". Suggest that it be made clear if 1) this restricts the scope of this report, or 2) if this statement means that uses of reanalysis should be included but that the assessment of attribution is not limited to this topic. Since the questions following this statement would seem to require information beyond reanalyses, it would seem that the charge is either the latter or that the questions below should be modified to make it clear how reanalyses enter each of the questions.

Page 3, line 34: Regional changes are considered in the draft prospectus, however, it is unclear if this report will cover the attribution of global changes.
Page 4, line 37: To address the attribution of observed climate variations requires consideration of important factors such as the affects of aerosols and long-term variability caused by variations in ocean circulation. Land cover change effects are also an important consideration for regional climate change. Suggest adding a contributing author with expertise in each of these areas. In particular, the current draft set of authors appears to be weak in its coverage of aerosol effects. --

Specific Comments- MacCracken

Page 3, Line 33: It would be very useful here if a first question were inserted that had to do with a global analysis of how the trends and patterns of variables such as of the global atmospheric circulation mesh with the record of the trends and patterns of global average surface temperature. While the second question (lines 37-38) would seem to do this for periods of apparent rapid change, this will only be understandable in the context of an analysis of the underlying long-term trends and behavior.

Page 3, Lines 34-36: First, the term "land-use changes" is rather narrow—this should include changes in land cover. One could keep using the land for agriculture, but have it be of different types, be irrigated, etc. Second, I would suggest also specifically listing anthropogenic aerosols (including sulfate, soot, etc.). It is quite likely that the regional forcing due to these aerosols was a good bit larger than for land-cover change, and the temporal variation in the pattern (including not only amount, but also height of injection, which affected dispersion and lifetime) is much more rapid and amenable to consideration over the time period of the record (i.e., since 1948), whereas land cover change has been much slower and is not so much over the mid-latitude regions of interest. Considering both land cover change and aerosols would thus greatly enrich the potential for ferreting out linkages with the climate as these two forcings have quite different latitudinal and temporal patterns.

Page 3, Lines 37-38: Including the example in parentheses here is an implicit recognition that such an abrupt change occurred at that time, whereas this study should really be taking a new look at the observations to see

if this is indeed the case. As has been indicated in various studies, there was no such abrupt change in the surface temperature record, and the newly revised sets of tropospheric data have not, to my knowledge, been analyzed looking for the supposed break in the record. It is also not clear if this if the apparent shift may be a result of the limited station coverage or even an artifact of a negative and positive anomaly being closer together than earlier. The wording is also a bit baffling in suggesting that a change in circulation is the same as a climate shift, whereas most scientists might want a climate shift to involve a much wider set of variables. And as phrased there is the implication that there has been more than one such shift, and I don't think it is clear yet that this is the case. Thus, I would recommend a bit more general phrasing, something like: What are the nature, magnitude, rapidity, and causes of any significant shifts in climate that occurred during the 20th century?

Page 6, Lines 12-37: The Prospectus here seems overly prescriptive given that a federal advisory committee is being appointed to offer their advice rather than simply be writers of what the agencies want written. I would suggest changing the use of the word "will" to something indicating that these are suggestions or they types of information wanted. In addition, by FACA rules, all documents considered by the advisory committee need to be available for public inspection throughout the process, whether they are drafts or not, so the version of the draft provided for expert review will need to be publicly available, even if not distributed for formal comment (remember that per FACA members of the public do have the opportunity for input at each meeting, so could quite conceivably offer comments on

the draft at that point). I also believe that copies of materials considered by the panel at a meeting also need to be available at a table outside the meeting for inspection, etc.

Page 6, Line 12 to Page 7, line 32: All this control of the review process by NOAA seems to me much too stringent. It is fine for NOAA to be asking for there to be a review and selecting a minimum set of reviewers, but the advisory committee and others should also be allowed to nominate reviewers and have the draft report submitted to them (in any case, it will be a public document, and so a member of the public could in any case comment, so why not just incorporate this into the process? It does not seem to me that it is at all NOAA's right or responsibility to prepare an official set of responses to reviewers—no problem if they want to do it for their own purposes, but the advisory committee members are the authors of this report and it should be their responsibility to do this—and to decide how all comments are dealt with. This whole separate and later review handled by NOAA up through the agencies seems much too much a remnant of the initial guidelines and should not be part of this process. No problem if the agencies want to submit comments during the review process and for the authors to consider them, and this could even be a separate third review phase, but it is up to ALL the authors to address them, not just a few. And note that the whole of the final report needs to be considered and approved (including with dissents, if appropriate) by the full advisory committee. And this final review process needs to be fully documented and public—this is a report of that committee, and the FACA rules apply. The agencies and NSTC can accept the report or not if they do not think the scope was carried out, and they can choose to act on it or not, but this report is a

report of the advisory committee and they have the final approval of it. Anything less is, I believe, a violation of FACA and an undue intrusion on the credibility of the report and of its scientific authors.